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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO@HUFFMANLAW.NET

## Office Action Summary

**Application No.**

09/977,084

**Applicant(s)**

UHLER, G. MICHAEL

**Examiner**

Eric Coleman

**Art Unit**

2183

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15, 17-20, 22-28 and 30-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 37 and 39 is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-20, 22-28, 30, 31, 34-36 and 38 is/are rejected.
- 7) ☒ Claim(s) 32 and 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,3,10,23,28,31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen (patent No. 5,115,506) in view of Sato (patent No. 5,459,682).

1. Cohen taught the invention substantially as claimed including a data processing ("DP") system comprising (As per claims 1,23,28,31):

2. A plurality of register sets (Normal register set and alternate register set)(e.g., see figs 1a, 1b); an interrupt vector generator for generating an exception vector associating with the interrupt handler, when the processing system receives and interrupt (e.g., see fig. 2 and col. 3, line 64-col. 4, line 8); mapping logic coupled to both of the register sets and the interrupt vector generator for selecting one of said plurality of register sets to be used by the interrupt handler (e.g., see col. 3, lines 13-45) wherein the mapping logic is programmably provided with a correlation between the exception vector and the selected on of the plurality of register sets (e.g., see col. 3, lines 13-45).

As to the limitation of the register sets being shadow register sets the only requirement of the registers sets to be shadow register sets is that they are the same in size. Each of the registers sets of Cohen are the same as the other register set and therefore each

provides a separate shadow register set. Together they provide for plural shadow register sets. Cohen did not expressly detail the shadow mapping logic comprises a plurality of entries, each of which is programmable to associate exception vectors with at least one of the plurality of shadow register sets. However Sato taught storing in a data memory register select data that is used to by a register set selector to select which register set would be used when a particular interrupt occurred (e.g., see col. 3, lines 2-32), and an interrupt memory (63) to store the content of the select data memory (44) where the data used to select the register set for a particular interrupt can be changed using register set select change enable data stored in program memory along with vector data (51) (e.g., see col. 4, lines 4-37). As to the plurality of entries it would have been obvious to one of ordinary skill that since Sato taught plurality of interrupts (e.g., see fig. 3 and col. 4, lines 20-43) and storing data for determining which register set (e.g., see fig. 1 and col. 3, lines 5-37) was to be accessed during the interrupts then the Sato system would have contained plural entries for the plural interrupts (e.g., see fig. 3). This register set selector along with the select data memory and interrupt memory and program memory that stored vector data[that relates to a leading address of the an interrupt service routine see col. 3, lines 17-26], register set select change data and register select change enable data that is selectively accessed for altering which register set is accessed during any particular interrupt of plural interrupts in the Sato system provides for the claimed mapping logic and interrupt generator. Further as to the entries corresponding to the exception vectors since the at least one entry was provided for the each interrupt then there was a correspondence between the entries

used to represent the each interrupt or access the register set and the vector used to access in interrupt service routine for that interrupt. Sato taught data referencing one of a plurality of register sets as detailed above.

3. It would have been obvious to one of ordinary skill in the DP art to combine the teachings of Cohen and Sato. Both references were directed to the problems of efficiently switching register sets upon occurrence of an interrupt (e.g., see col. 1, line 55-col. 2, line 25 of Sato). One of ordinary skill would have been motivated to incorporate the Sato teachings of storing data for changing the register set in rewritable memory at least to provide for a more flexible system facilitating real-time interrupt processing (e.g., see col. 2, lines 6-25).

4. As to the limitation wherein each the entries corresponds to one of a plurality of exception vectors; and contains one of a plurality of exception vectors; and contains data referencing one of the plurality of shadow register sets, Sato taught register set select data (42) for referencing and selecting register set which was used separately for servicing interrupt which caused change of register set and interrupt vector data (51) relating to the starting address of the interrupt service routine (e.g., see col. 3, lines 6-32. Therefore the register select data contained data referencing one of the shadow register sets and corresponded to one of the plurality of interrupt or exception vectors. Interrupts in response to exceptions was well known in the art at the time of the claimed invention therefore it would have been within the level of skill of one of ordinary skill in the art for incorporating interrupt in response to exceptions in the Cohen and Sato system at least since Cohen taught exceptions (e.g., see col. 1, lines 14-35).

5. As the limitations of claim 28, 31, where the features discussed above are claimed as program code for providing the elements claimed since Cohen system comprised processor on a semiconductor chip that provided for interrupts it would have been anticipated that the features would have been programmed for controlling the elements as discussed above. The use of hardware or software for the particular portions operation are equivalent implementations merely determined depending on cost/speed necessary for the system.

6. As per claim 2, Cohen taught each of the plurality of shadow register sets compromise a plurality of duplicate register sets comprise a plurality of registers that duplicate registers of a general purpose (GPR set) (e.g., see col. 3, lines 7-28).

7. As per claim 3, Cohen taught the correlation comprises a maps an exception vector to one of said plurality of shadow register sets (e.g., see col. 3, lines 29-63) and Sato taught a map register (42) that binds each of the shadow register sets to a particular exception vector and the vector the register set (e.g., see fig. 1)[the program status register has data that indicates the register set to be selected at the time of the interrupt, where the interrupt itself is bound to a interrupt vector for accessing the interrupt service routine therefore the register set is bound to particular interrupt or exception vector (e.g., see col. 3, lines 2-26)].

8. As per claim 10,11,12 Cohen taught a status register, for storing data corresponding to a current shadow set, and a previous shadow set (e.g., see CSC register and CSC' register (e.g., see fig. 1C). Sato taught storing data comprising a program status word for the plurality interrupts as to which register set was to be used

for the particular interrupt (e.g. see col. 3, lines 8-12). Therefore one of ordinary skill would have been motivated store in the program status register data for a current register set and a shadow register set indicating the register set to be accessed for each interrupt. Clearly one of ordinary skill would have recognized that in at least one implementation of the Cohen and Sato teachings the data for the current set and shadow set would have been stored in specific locations wherein when the a change or register set would have been performed the change in location of the data would have occurred. This would have facilitated the system in accessing the data for the current or shadow data at the location of each would have been established.

9. As per claim 23, Cohen taught a microprocessor (semiconductor chip 12 with CPU 14) having a first register set (normal register set) for use by non-interrupt instructions, and a second (Normal register set) and third register sets(alternate register) for use by interrupt service routines the microprocessor comprising: a vector generator, for generating exception vectors corresponding to the interrupt service routines; and mapping logic, coupled to said vector generator, for selecting between the second and third register sets for use by the interrupt service routines based on a value of said exception vectors interrupt (e.g., see fig. 2 and col. 3, line 64-col. 4, line 8)[Cohen taught in the body of the claim and plurality shadow registers however does not reference first register set and does not require the first register set and therefore the use of a first register set is given no weight. Further Sato taught second and third register sets that were accessed when an interrupt was being processed (e.g., see fig. 1 and col. 3, lines 5-37). Also, since the system used a particular interrupt vector to

access a interrupt service routine and a particular set of registers for a particular interrupt then the data for referencing the register sets corresponds to the exception vector for the particular interrupt and the field of the register containing the register set selection contains data referencing one of the plurality of register sets.

Claims 1,2, 3,4, 7,8, 9,14,15, 20,22, 23, 26,27, 28,31,34-36,38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maupin in view of Sato.

10. Maupin taught invention substantially as claimed comprising a data processing ("DP") system comprising: (As per claims 1,2,14,20,22,23): a plurality of shadow register sets with addressable registers (46a,46b,46c,46d, 46e,46f,46g) a least one for default task and plurality of register sets each shadow register set dedicated to a different interrupt source (e.g., see col. 2, lines 56-64); interrupt vector generator (e.g., see col. 5, lines 35-44) and shadow set mapping logic coupled to register sets and interrupt generator (e.g., see col. 6, lines 16-32)[task-ids assigned to interrupt sources and execution core correlates task-ID to interrupt source and using interrupt task-ID to select register set (46a-46H).

11. Maupin did not expressly detail the shadow mapping logic comprises a plurality of entries, each of which is programmable to associate exception vectors with a at least one of the plurality of shadow register sets. However Sato taught storing in a data memory register select data that is used to by a register set selector to select which register set would be used when a particular interrupt occurred (e.g., see col. 3, lines 2-32), and an interrupt memory (63) to store the content of the select data memory (44) where the data used to select the register set for a particular interrupt can be changed



using register set select change enable data stored in program memory along with vector data(51) (e.g., see col. 4, lines 4-37). As to the plurality of entries it would have been obvious to one of ordinary skill that since Sato taught plurality of interrupts (e.g., see fig. 3 and col. 4, lines 20-43) and storing data for determining which register set (e.g., see fig. 1 and col. 3, lines 5-37) was to be accessed during the interrupts, then the Sato system would have contained plural entries for the plural interrupts (e.g., see fig. 3). This register set selector along with the select data memory and interrupt memory and program memory that stored vector data[that relates to a leading address of the an interrupt service routine see col. 3, lines 17-26], register set select change data and register select change enable data that is selectively accessed for altering which register set is accessed during any particular interrupt of plural interrupts in the Sato system provides for the claimed mapping logic and interrupt generator. Further as to the type of memory (i.e. registers that stored claimed data) One of ordinary skill would have been motivated at the time of the claimed invention to utilize high speed memory (i.e., registers) to facilitate the real-time interrupt processing and register set changes as taught by Sato (e.g., see 2, lines 7-27) and take advantage of the reduced cost of memory at the time of claimed invention versus at the time Sato patent was filed. As to the further limitations of claim 26, the Maupin and Sato system comprised a programmed data processing system and therefore the operations of the system including the mapping of register sets would have been programmed (either implemented in hardware, firmware or software). Since Maupin and Sato taught in the operation of the system each time a particular interrupt occurred a corresponding

register set was selected using predetermined selection criteria or data then it would have been obvious to one of ordinary skill that the shadow set mapping logic bound each of the register sets to a particular one of a plurality of interrupt routines. As to the interrupt routines being exception routines the use of interrupt routines to service exceptions was well known in the art at the time of the claimed invention. Maupin taught mapping logic comprising (claim 26) plural programmable registers corresponding to interrupt routines (e.g., see col. 4, lines 11-36 and col. 5, lines 34-55)[the bits in the service request register indicates which interrupt service routine is to be used to service the request]. And task ID register stores data that references at least one of the plurality of shadow register sets and where the data in the task id register corresponds to the interrupt task indicated in the service request register.

12. As to the further limitations of claim 23, Sato taught entries correspond to one of plurality of interrupt vectors and contains referencing either the second or the third sets (e.g., see col. 3, lines 6-50). Since exceptions were well known to cause interrupts that are serviced by interrupt service routines and therefore one of ordinary skill would have been motivated to processes system exceptions using the interrupts and interrupt service routine of Sato and the register set switching of Sato which switch between at least three register sets (e.g., see fig. 1).

13. It would have been obvious to one of ordinary skill in the DP art to combine the teachings of Maupin and Sato. Both references were directed to the problems of efficiently switching register sets upon occurrence of an interrupt (e.g., see col. 1, line 55-col. 2, line 25 of Sato). One of ordinary skill would have been motivated to

incorporate the Sato teachings of storing data for changing the register set in rewritable memory at least to provide for a more flexible system facilitating real-time interrupt processing (e.g., see col. 2, lines 6-25 of Sato).

14. As to the limitation of claim 7, 27, wherein the contents of each of the plurality of entries is provided by a programmer and programmer determining the data to store in the programmable registers within shadow set mapping logic, Sato and Maupin taught a programmed system with data that the system recognizes for performing operation and therefore it would have been obvious to one of ordinary skill that a programmer provided the data for programming the system so that the system would recognize the data including the interrupt data and register set data and data within the shadow set mapping logic (e.g., see col. 3, line 61-col. 4, line 10 of Maupin and col. 3, lines 17-32 of Sato).

15. As the limitations of claim 28, 31, where the features discussed above are claimed as program code for providing the elements claimed since Maupin system comprised processor on a semiconductor chip that provided for interrupts it would have been anticipated that the features would have been programmed for controlling the elements as discussed above. The use of hardware or software for the particular portions operation are equivalent implementations merely determined depending on cost/speed necessary for the system. Further the entries of claim 1, in the cited prior art are stored in fields for registers and therefore meet the fields limitation of claim 31.

16. As per claim 3, Maupin taught the correlation comprises a map register that maps the exception vector to a selected one of the plurality of register sets (task-id register ) e.g., see col.5, lines 35-55 and col. 6, lines 16-28)[value in the task register used to map the exception vector or interrupt source to register set];

17. As per claim 4, Maupin taught the interrupt vector generator selects a particular one of a plurality of interrupt routines to be used to handle the interrupt (e.g., see col. 5, lines 34-44);

18. As per claim 14, Maupin taught a mapping logic comprising a plurality of programmable fields, each corresponding to one of a plurality of exception vectors, each of the plurality of fields containing data referencing one of the plurality of shadow register sets (e.g., see col. 5, lines 34-55). Maupin did not expressly detail the shadow mapping logic comprises a plurality of entries, each of which is programmable to associate exception vectors with at least one of the plurality of shadow register sets. However Sato taught storing in a data memory register select data that is used to by a register set selector to select which register set would be used when a particular interrupt occurred (e.g., see col. 3, lines 2-32), and an interrupt memory (63) to store the content of the select data memory (44) where the data used to select the register set for a particular interrupt can be changed using register set select change enable data stored in program memory along with vector data (51) (e.g., see col. 4, lines 4-37). As to the plurality of entries it would have been obvious to one of ordinary skill that since Sato taught plurality of interrupts (e.g., see fig. 3 and col. 4, lines 20-43) and storing data for determining which register set (e.g., see fig. 1 and col. 3, lines 5-37) was to be

accessed during the interrupts then the Sato system would have contained plural entries for the plural interrupts (e.g., see fig. 3). This register set selector along with the select data memory and interrupt memory and program memory that stored vector data[that relates to a leading address of the an interrupt service routine see col. 3, lines 17-26], register set select change data and register select change enable data that is selectively accessed for altering which register set is accessed during any particular interrupt of plural interrupts in the Sato system provides for the claimed mapping logic and interrupt generator. Further as to the type of memory (i.e., registers that stored claimed data) One of ordinary skill would have been motivated at the time of the claimed invention to utilize high speed memory (i.e., registers) to facilitate the real-time interrupt processing and register set changes as taught by Sato (e.g., see 2, lines 7-27) and take advantage of the reduced cost of memory at the time of claimed invention versus at the time Sato patent was filed.

19. As to the limitation (claim 14) wherein each the entries corresponds to one of a plurality of exception vectors corresponding to one of the plurality of interrupt routines; and contains one of a plurality of exception vectors; and contains data referencing one of the plurality of shadow register sets, Sato taught register set select data (42) for referencing and selecting register set which was used separately for servicing interrupt which caused change of register set and interrupt vector data (51) relating to the starting address of the interrupt service routine (e.g., see col. 3, lines 6-32). Therefore the register select data contained data referencing one of the shadow register sets and corresponded to one of the plurality of interrupt or exception vectors. Interrupts in

response to exceptions was well known in the art at the time of the claimed invention therefore it would have been within the level of skill of one of ordinary skill in the art for incorporating interrupt in response to exceptions in the Maupin and Sato system.

20. As to the off core and on core interrupts (claim 15), Maupin taught external source register set (46G) for external interrupts and A/D register set for internal A/D interrupt (e.g., see fig. 2 and col. 3, lines 37-67).

21. As per claim 8, Maupin taught eight different register sets and therefore since it would require four bits to select between eight register sets (e.g., see fig. 2)(one for each interrupt source) then one of ordinary skill would have been motivated to employ four bits for the programmable fields.

22. As per claim 9, 20, 22, Maupin taught the data in each of the plurality of fields corresponds to one of plurality of shadow register sets (e.g., see col. 5, line 34-col. 6, line 2). The data that selects a register set for an interrupt provides an binding of a registers set to the interrupt and the interrupt routine that is used to service the interrupt at least for the time that the interrupt is being serviced. As to the limitation wherein each the entries corresponds to one of a plurality of exception vectors; and contains one of a plurality of exception vectors; and contains data referencing one of the plurality of shadow register sets, Sato taught register set select data (42) for referencing and selecting register set which was used separately for servicing interrupt which caused change of register set and interrupt vector data (51) relating to the starting address of the interrupt service routine (e.g., see col. 3, lines 6-32. Therefore the register select

data contained data referencing one of the shadow register sets and corresponded to one of the plurality of interrupt or exception vectors. Interrupts in response to exceptions was well known in the art at the time of the claimed invention therefore it would have been within the level of skill of one of ordinary skill in the art for incorporating interrupt in response to exceptions in the and Sato system.

23. As per claim 26, 27,38 Maupin taught upon receipt of an interrupt, determining which one of a plurality of exception routines should be executed (e.g., see col. 4, lines 1-10); and based on the received interrupt, selecting one of a plurality of shadow register sets to be utilized by the one of the plurality of exception routines wherein the step of selecting utilizes programmable registers that contain data indicating which one of the plurality of shadow register sets is to be used for its register (e.g., see col. 4, lines 11-36). Maupin also taught that each of the programmable registers corresponds to one of the exception routines (e.g., see col. 6, lines 16-29).

24. As to the further limitations of claims 34-36,38, the claims include the limitations of storing data in a previous set data register and storing data in a current set data register and a description of the purpose of the data stored in the data. The claims comprise conveying an indication to the current data register and when the second interrupt is received moving the contents of the current set data register to the previous set data register. Maupin taught the storing data within plural registers including separate registers for each of plural register sets at discussed above. The description of the purpose for the data is merely a view of the data and does not change the structure

or operation of the system over the teachings of Maupin and/or Sato. Therefore as claimed Maupin and Sato meet the limitations of claims 34-36 and 38 as discussed above. As to the storing data in a previous in data set register and a current data set register Maupin taught scheduling using the request registers to store the indication of the service requested and the register set to be used (e.g. see col. 7, lines 37-62 and col. 6, lines 16-41). As to Moving the contents of one register to another register this at least would have been within the level of skill in the DP art considering that the Maupin and Sato system comprised interrupts there the system would have interrupted a process and returned to the interrupted process. And the storing of data for each process in different registers and restoring registers for the current process upon return this process was well known in the DP art at the time of the claimed invention. If the control data indicating the task that was interrupted and to be returned was stored in the Maupin and Sato system then the system would not known which task was interrupted and when to return and one of ordinary skill would have been motivated to store this data register for fast access to this data.

***Claim Rejections - 35 USC § 103***

25. Claims 10,11,12,13,24,25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maupin in view of Sato (patent No. 5,459,682) .

26. Maupin taught the invention substantially as claimed including a data processing ("DP") system comprising: a plurality of shadow register sets with addressable registers (46a,46b,46c,46d, 46e,46f,46g) a least one for default task and plurality of register sets



each shadow register set dedicated to a different interrupt source (e.g., see col. 2, lines 56-64); interrupt vector generator (e.g., see col. 5, lines 35-44) and shadow set mapping logic coupled to register sets and interrupt generator (e.g., see col. 6, lines 16-32)[task-ids assigned to interrupt sources and execution core correlates task-ID to interrupt source and using interrupt task-ID to select register set (46a-46H).

27. As per claim 24,25 Maupin taught a status register)(storing task-Id) (e.g., see col. 6, lines 16-28) Maupin did not specifically detail the data corresponding to a current shadow set and a previous shadow set (or corresponding to first and second exception vector or data referencing either the second register set or the third register set).

28. Sato taught storing data comprising a program status word for the plurality interrupts as to which register set was to be used for the particular interrupt (e.g. see col. 3, lines 8-12). Therefore one of ordinary skill would have been motivated store in the program status register data for a current register set and a shadow register set indicating the register set to be accessed for each interrupt. One of ordinary skill would have motivated to provide that in at least one implementation of the Maupin and Sato teachings the data for the current set and shadow set would have been stored in specific high speed locations wherein when the a change or register set would have been performed the change in location of the data would have occurred. This would have facilitated the system in accessing the data for the current or shadow data at the location of each would have been established.

29. As per claim 10,11, Maupin taught a status register)(storing task-Id) (e.g., see col. 6, lines 16-28). Maupin also taught providing separate registers sets to eliminate the need to store data of a current task for speeding processing. Maupin did not specifically detail the status data registers corresponding to a current shadow set and a previous shadow set (or corresponding to first and second exception vector or data referencing either the second register set or the third register set). Sato taught storing data comprising a program status word for the plurality interrupts as to which register set was to be used for the particular interrupt (e.g. see col. 3, lines 8-12). Therefore one of ordinary skill would have been motivated store in data the status registers data for a current register set and a shadow register set indicating the register set to be accessed for each interrupt. This would have facilitated the access to the status data for the particular task. One of ordinary skill would have recognized that in at least one implementation of the Maupin and Sato teachings the data for the current set and shadow set would have been stored in specific locations wherein when a change of register set would have been performed the change in location of the data would have occurred. This would have facilitated the system in accessing the data for the current or shadow data at the location of each would have been established.

30. As per claim 12,13 The saving of the status of registers upon occurrence of an interrupt and restoring the context are the interrupt was serviced was well known in the art at the time of the claimed invention.

31. Claims 5,6,17-19,30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maupin and Sato as applied to claims 1-4,14,15 28 above, and further in view of M. Morris Mano (book entitled Computer system Architecture) hereafter referred to as Mano.

32. As per claim 5,18 Mano taught the selected particular one of a particular of the interrupt routines is located in a memory at the corresponding exception vector (e.g., see pages 440-441 under Software routines section).

33. As per claim 6,17, Mano taught the interrupt vector generator selected a particular one of a plurality of interrupt routines to be used to handle the interrupt based on the priority level of the interrupt (e.g., see pages 437-441).

34. As per claim 19 Maupin taught the interrupt vector generator selects a particular one of a plurality of interrupt routines to be used to handle the interrupt (e.g., see col. 5, lines 34-44) The data that selects a register set for an interrupt provides an binding of a registers set to the interrupt and the interrupt routine that is used to service the interrupt at least for the time that the interrupt is being serviced.

35. As the limitations of claim 28, 30, where the features discussed above are claimed as program code for providing the elements claimed since Maupin system comprised processor on a semiconductor chip that provided for interrupts it would have been anticipated that the features would have been programmed for controlling the elements as discussed above. The use of hardware or software for the particular portions operation are equivalent implementations merely determined depending on cost/speed necessary for the system.

36. It would have been obvious one of ordinary skill in the DP art to combine the teachings of Maupin and Mano. Maupin taught system where interrupt were generated and serviced using plural register sets (e.g., see col. 5, lines 35-44) but did not specify the circuitry for controlling the access to interrupt handling routines. Mano taught the conventional means and method for implementing the handling of interrupts in a DP system. Therefore one of ordinary skill in the DP art would have been motivated incorporate the teachings of Mano at least to implement effectively Mano teachings.

37. The rejections as set forth in the last office action (and repeated above) are hereby maintained.

38. The change in scope of amended claimed has necessitated a new search.

***Allowable Subject Matter***

Claim 37,39 are allowed.

Claims 32-33, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

Applicant's arguments filed 10/31/07 have been fully considered but they are not persuasive.

The applicant argues in substance that Sato did not teach "shadow set mapping logic comprises a plurality of entries, each of which is programmable to associate exception vectors with at least one of said plurality of shadow register sets, wherein

each of said entries: corresponds to one of a plurality of exception vectors with at least one of said plurality of shadow register set, wherein each of said entries : corresponds to one of a plurality of exception vectors; and contains data referencing one of said plurality of shadow register sets". The Examiner contends that the scope of the claim with respect to " mapping logic" provides any way (and with any number of system elements in hardware or software ) that the system could associate exception vectors with at least one shadow register set. Sato taught the use of the elements as described in outstanding office action that provided selection of a register of a register set and processing the interrupt in response to an interrupt or exceptions. The Examiner contends selection of a register in response to an interrupt associates the register and the interrupt. The processing of the interrupt requires interrupt vector access to interrupt routine and Sato taught an interrupt generator and vector data as described in the outstanding action. The data used including register select change data provides the system with the data needed to select the register set and even assuming there is further computation the mapping logic, however the claims are not limited to any structure or number of elements of particular types of Elements and so elements, and data used by Sato meet the claimed limitations. As to there being plural programmable fields, at least the entry or field of the vector data and the register set select data (e.g, see col. 3, lines 13-65) provide plural entries used to associate the vector with the corresponding register set. The register set select data is used to change register set and therefore reference the shadow register set upon an interrupt and the vector data is used to address interrupt service routine.

Applicant argues that Maupin is directed to a system for eliminating interrupts and therefore one would not be motivated to modify Maupin as suggested as this allegedly would contravene the purposes of Maupin to eliminate interrupts. The Examiner contends that Maupin does not preclude the use of interrupts as Maupin suggested that (e.g., see col. 2, lines 34-43) "that context save and restore operations may reduced or eliminated...The interrupt service may record interrupt service request instead of signaling an interrupt to the processor. Periodically the processor may poll the interrupt sources to determine if a service request is recorded." The Examiner contends that Maupin provides for allowing the processor to delay when it processing interrupts by allowing the interrupt requests to be stored and the processor polls the interrupt request register when it is ready to process the interrupt. However the processing of the interrupt including accessing the appropriate register set for the register sets of Maupin and accessing the interrupt service routine is still performed in the Maupin teachings (e.g., see col. 4, lines 2-35). The performance increase is taught as realized due to dedicating register sets to corresponding tasks and so save and restore operations can be reduced or eliminated. In this operation when a task was changed (such as to an interrupt service routine) a new register set would have been selected.

Applicant argues the register binds each shadow register set to a particular vectors. The Examiner contends that since the register sets are dedicated to task which is requested by corresponding interrupting source indicated by the content of a register then the shadow register sets are bound to the interrupt service task and therefore

bound to the address that starts the interrupt service routine namely the vector (see response to argument above). Sato provided that there was a selection of register set when register change data is input however Sato allows for there to be predetermined assignment of register select data and register set. Sato provided that when register set change data was input a register set was selected in a manner where the system would have predetermined which register set in response to a particular register set change data. Note there is no step or means requiring a change a relationship between a particular input register change data and the input and the selected register set. As the claim is understood data in a register "binds" a exception to a interrupt vector by providing the data that enables the system to associate or use the vector with the interrupt or exception and Sato and Maupin perform this operation.

Applicant argues the entries are provided by a programmer. As this is understood the programmer is the one who programmed the system to access a particular interrupt routine and register set in response a specific interrupt. This would have Been required to implement the teachings of the cited prior art.

### **Conclusion**

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

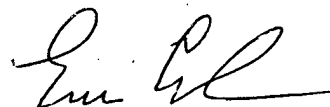
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Coleman whose telephone number is (571) 272-4163. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4162. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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PRIMARY EXAMINER